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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/575,625

04/13/2006

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EXAMINER

HU, SHOUXIANG

ART UNIT

PAPER NUMBER

2811

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DELIVERY MODE

03/13/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/575,625	Applicant(s) SAKAI ET AL.	
	Examiner Shouxiang Hu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/15/07; 4/13/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the subject matters that recited second nitride semiconductor layer contains a region having a low Al content and a region having a high Al content, which directly contradicts to what is claimed in claim 1, where the second nitride semiconductor layer is defined as being made of a same compound: $\text{Al}_{x1}\text{Ga}_{1-x1}\text{N}$. It is not clear whether the high-Al region and low-Al region are located within a same island or in separated islands in the second nitride semiconductor layer of the instant invention.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 10-12 and 14, insofar as being in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 102(e) as being anticipated by Shibata (Shibata et al., US 2002/0155682; of record).

Shibata discloses a Group-III nitride semiconductor element (Figs. 1-4; also see [0065] through [0071]), comprising a substrate (such as sapphire single crystal) with a first nitride semiconductor layer (AlN) provided thereon (similar to what is included in layer 1 shown in Figs. 1-3); a second nitride semiconductor layer composed of $\text{Al}_{x_1}\text{Ga}_{1-x_1}\text{N}$ (similar to layer 2 in Figs. 1-3; such as: $\text{Al}_{0.1}\text{Ga}_{0.9}\text{N}$, with $x_1 = 0.1$; island-shaped) provided on the first nitride semiconductor layer; and, a third nitride semiconductor layer composed of $\text{Al}_{x_2}\text{Ga}_{1-x_2}\text{N}$ (similar to layer 3A in Figs. 2 and 3; such as: $\text{Al}_{0.95}\text{Ga}_{0.05}\text{N}$, with $x_2 = 0.95$) provided on the second nitride semiconductor layer.

Regarding claim 3, it is further noted that the second nitride semiconductor layer in Shibata is formed of the islands (2-1 through 2-4) arranged separately from one another; and, the crystals in these islands inherently have different heights, as they are self-formed (i.e., without the help of any masks) through a MOCVD method, in a manner substantially same as that in the instant invention.

Regarding claim 4, insofar as being in compliance with 35 U.S.C. 112, it is further noted that portions of layer 3A that are located between the islands (2-1 through 2-4) in Shibata can also be regarded as extended portions of the entire second nitride layer on a same level, which naturally results in regions with different Al contents in such an entire second nitride layer on a same level.

Regarding claim 10, the second nitride semiconductor layer in Shibata is undoped.

Regarding claims 11 and 12, the Group-III nitride semiconductor element of Shibata is for the use in a Group III nitride semiconductor light-emitting device (see Fig. 4; a diode), further comprising a fourth nitride semiconductor layer (see layers 13-17) provided on said third nitride semiconductor layer of said semiconductor element, said fourth nitride semiconductor layer including an n-type layer (13 and/or 14), a light-emitting layer (15), and a p-type layer (16 and/or 17), which are successively formed atop said third nitride semiconductor layer in this order; a negative electrode (18) provided on said n-type layer; and a positive electrode provided on said p-type layer (19).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7-9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata.

The disclosure of Shibata is discussed as applied to claims 1-4, 10-12 and 14 above.

Although Shibata does not expressly disclose that the second nitride semiconductor layer can have a thickness of about 1 to 300 nm, and/or that the first nitride semiconductor layer can have a thickness of about 5 to 500 nm, it is noted that the thickness of such layers are art-recognized result-oriented parameters of importance, subject to routine experimentation and optimization; and that such recited thicknesses are well within and/or overlapping with the commonly recognized thickness ranges for such layers.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the device/element of Shibata with the first and/or second nitride semiconductor layers being formed with the recited thickness(es), so that a nitride-semiconductor device/element with optimized performance would be obtained, as it has been held that:

“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In *re* Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

5. Claims 5, 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata in view of Sakai (Sakai et al., US 2003/0016526).

The disclosure of Shibata is discussed as applied to claims 1-4, 7-12, 14 and 15 above.

Although Shibata does not expressly disclose that the second nitride semiconductor layer can be formed of GaN (i.e., $x_1 = 0$) and that the device can be a

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laser, one of the ordinary skill in the art would readily recognize that the specific composition of such a second nitride semiconductor layer is an art-recognized result-oriented parameter of importance, subject to routine experimentation and optimization; and, as evidenced in Sakai (Figs. 1, 3A and 3B; see layer 12 in Figs. 3A and 3B), such a recited composition (i.e., with $x_1 = 0$) is commonly used for achieving desired quality in the epitaxial layer thereon; and that such as an epitaxially grown nitride-based substrate/base can be desirably used to form a laser with desired wavelength and/or quality (see the abstract of Sakai).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the GaN (i.e., $x_1=0$) nitride layer and/or laser structure of Sakai into the device/element of Shibata, so that a nitride-based device/element/laser with desired and/or optimized quality/performance would be obtained.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References A-D are cited as being related to a gallium-nitride-based device structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Friday, 8:30 AM to 5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shouxiang Hu/
Primary Examiner, Art Unit 2811
March 4, 2008